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09/705,100	11/02/2000	Joseph Wang	37000UT9917	4989

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EXAMINER	
MUTSCHLER, BRIAN L	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 02/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/705,100	WANG ET AL.	
	Examiner	Art Unit	
	Brian L. Mutschler	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-84* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34,36-65 and 67-84* is/are rejected.

7)☒ Claim(s) *35 and 66* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Comments

1. The objections to the specification have been overcome by Applicant's amendment correcting the minor informalities.

2. The rejection of claims 1-38 and 62 under 35 U.S.C. 112, second paragraph has been overcome by Applicant's amendment to the claims.

3. The declaration filed on November 21, 2003, under 37 CFR 1.131 is sufficient to overcome the Freemantle ("Downsizing chemistry", C&EN, pp. 27-35 (Feb. 22, 1999)) reference. Consequently, the rejection of claims 8, 30, 31 and 41 is withdrawn.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 31 and 39-63 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 31 recites the limitation "the cavity" in line 2. This limitation is indefinite because it is inconsistent with the limitation "at least one cavity" in claim 28, from which claim 31 depends. It is not clear whether the structure of claim 31 contains only one of the at least one cavities, or if the apparatus comprises a plurality of cavities.

Claim 39 recites the limitation "the inlet end of a microfluidic channel disposed on a first substrate having an inlet end and an outlet end at an edge of the first substrate" in

lines 2-3. This limitation is indefinite because there is insufficient antecedent basis for "the inlet end of a microfluidic channel" and because it is not clear whether the phrase "having an inlet end and an outlet end" refers to the microfluidic channel or the first substrate. The same applies to dependent claims 40-63.

Claim 44 recites the limitation "the electrokinetic fluid transport" in line 1. There is insufficient antecedent basis for this limitation in the claim. An electrokinetic fluid transport is not introduced until claim 43.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-7, 9-20, 25-34 and 36-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathies et al. (WO 98/09161) in view of Wang et al. ("Performance of screen-printed carbon electrodes fabricated from different carbon inks", ELECTROCHIMICA ACTA, Vol. 43, No. 23, pp. 3459-3465 (1998)).

Regarding claims 1, 39 and 42, Mathies et al. disclose an apparatus and a method of using the apparatus comprising a first substrate **11** having capillary channels formed therein, and a second substrate (top plate) **14** bonded to the first substrate **11** (page 6, lines 2-16). Electrodes for electrochemical detection can be fabricated on the second substrate **14** (page 6, lines 25-27). Mathies et al. describe the conventional

chips as having a plurality of separation channels **12** (page 6, lines 2-16; figure 1). Separations are performed by applying a potential across the channel (see figure 3). The channels comprise an inlet end and an outlet end at an edge of the first substrate (figs. 18 and 20). This rejection is supported by two different interpretations of the edge of the substrate. First, as seen in Figure 20, the outlet end of the channel **46** is formed at one edge of the substrate; being formed at an edge does not require the channel to pass through the edge of the substrate. Second, the outlet end of the channel terminates a reservoir, which forms an inner edge of the substrate (figs. 18 and 20). Therefore, the outlet end of the channel terminates at an edge of the substrate.

Regarding claims 2-6 and 43-45, the fluidic transport system comprises a conductive system using electrodes and a high-voltage power supply to power the electrodes and create an electrokinetic fluid transport (page 7, line 1 to page 8, line 2; fig. 23).

Regarding claims 7, 10-14, 40, 46 and 47, Mathies et al. disclose the use of a reference electrode, electrical contacts to the electrodes and an analyte analysis system connected to the detection electrode (page7, line 1 to page 9, line 30). The analysis system uses amperometric detection and can use stepped or fixed potential detection (page 9, line 17 to page 10, line 32).

Regarding claims 17, 18, 50 and 51, the separation channel has a width of 1-2000 μm, with a preferable width between 1-500 μm (page 7, line 29 to page 8, line 2).

Regarding claims 25-27 and 57-59, the detection electrode may comprise metals or carbon (page 6, lines 25-31).

Regarding claims 28-32, the apparatus comprises a plurality of cavities (reservoirs) in fluidic connection with the separation channel at the inlet end (page 9, lines 1-16; fig. 3). In addition, a plurality of channels in communication with the cavities is also disclosed (fig. 1).

Regarding claim 33, Mathies et al. disclose that conventional apparatuses have a plurality of separation channels (page 6, lines 2-16; fig. 1).

Regarding claims 34, 36 and 37, Mathies et al. show the first and second substrates **11** and **14** as substantially planar and parallel (0° angle) to each other, with the second substrate bonded (sealed) to the first substrate (page 6, lines 2-31).

Regarding claims 38 and 63, the channels contain a separation matrix (polyacrylamide) (page 6, lines 13-14; page 13, lines 21-22).

Regarding claim 41, Mathies et al. disclose the separation of a *Hae*III restriction, which includes at least one reactant to perform the digest, diluted with buffer, which are reacted and mixed prior to analyzing the analyte (page 13, lines 10-27). Another example disclosed by Mathies et al. comprises the analysis of a Salmonella PCR reaction product (page 13, lines 10-27).

Regarding claim 54, the distance between the detection electrode and the outlet of the microfluidic channel is fixed when the second substrate is bonded to the first substrate (page 6, lines 2-16).

Regarding claims 55 and 56, Mathies et al. disclose examples providing a range of distances between the outlet end of the channel and the electrode, including distances of 20 μm, 30 μm, 300 μm and 600 μm (page 7, lines 20-25; page 11, line 11

to page 12, line 2). Mathies et al. teach that the placement of the electrode can minimize the influence of the electrophoresis voltage (page 7, lines 22-25).

Regarding claim 60, Mathies et al. disclose the use of a solution containing a buffer (page 9, lines 1-16).

Regarding claims 61 and 62, Mathies et al. disclose the use of nucleic acids, including DNA, and other compounds such as dopamine, epinephrine and catechol (page 12, line 15 to page 14, line 2).

The apparatus and method of Mathies et al. differs from the instant invention because Mathies et al. do not disclose the following:

a. A thick-film electrode, as recited in claims 1 and 39.

b. The second substrate is a ceramic, polymeric or plastic substrate, as recited in claim 9.

c. A stripping potentiometry system and a voltammetric detection system, as recited in claims 15 and 48.

c. The thick-film electrode is a screen-printed electrode, as recited in claims 16 and 49.

d. The thick-film electrode has a thickness from about 1 μm to about 100 μm, as recited in claims 19 and 52.

e. The thick-film electrode has a thickness from about 8 μm to about 30 μm, as recited in claims 20 and 53.

f. The thick-film electrode is a carbon ink electrode, as recited in claims 25 and 57.

g. The distance between the thick-film electrode and the outlet end of the microfluidic channel is from about 50 μm to about 100 μm, as recited in claim 56.

Regarding claims 1 and 39, the phrase "thick-film electrode" uses relative terminology that does not distinguish what constitutes a "thick-film" electrode. However, with regard to claims 1, 16, 25, 39, 49 and 57, Wang et al. disclose the use of "thick-film" electrodes comprising screen-printed carbon ink electrodes for microfabricated sensors and also teaches that such sensors are desirable because the are "extremely inexpensive" and are "highly reproducible electrochemical sensors" (see Abstract and Introduction).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus and method of Mathies et al. to use screen-printed, carbon ink thick-film electrodes as taught by Wang et al. because such electrodes are extremely inexpensive and highly reproducible.

Regarding claim 9, Wang et al. discloses the use of a ceramic substrate on which the electrode is formed (see "Screen-printing fabrication").

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the second substrate of Mathies et al. to use a ceramic substrate because ceramic substrates are mechanically strong and stable at a wide range of temperatures.

Regarding claims 15 and 48, Wang et al. disclose the use of pulse-voltammetric, amperometric and stripping operations to measure the currents using the detection electrodes (see Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus and method of Mathies et al. to use a voltammetric or stripping detection system as taught by Wang et al. because such detection systems allow the measurement of a wide range of electrochemical reactivities.

Regarding claims 19, 20, 52, 53 and 56, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrodes and distances in the apparatus and method of Mathies et al. to use such ranges because the electrode thickness and separation distance are result effective variables that are dependent upon the electrode material and the reaction being analyzed, respectively. Different reactions and different materials all have different properties that would require an obvious variation in the operating parameters in the apparatus and method. Additionally, Mathies et al. specifically disclose that the distance between the outlet of the channel and the electrode can minimize the influence of the electrophoresis voltage (page 7, lines 22-25).

8. Claims 8 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathies et al. (WO 98/09161) in view of Wang et al. ("Performance of screen-

printed carbon electrodes fabricated from different carbon inks", ELECTROCHIMICA ACTA, Vol. 43, No. 23, pp. 3459-3465 (1998)), as applied above to claims 1-7, 9-20, 25-34 and 36-63, and further in view of Dubrow et al. (U.S. Pat. No. 6,251,343).

Mathies et al. and Wang et al. describe an apparatus and method having the limitations recited in claims 1-7, 9-20, 25-34 and 36-63 of the instant invention, as explained above in section 7.

Regarding claim 8, Mathies et al. disclose that the first substrate is made of etched glass (page 6, lines 2-16).

Regarding claim 22, the distance between the detection electrode and the outlet of the microfluidic channel is fixed when the second substrate is bonded to the first substrate (page 6, lines 2-16).

Regarding claims 23 and 24, Mathies et al. disclose examples providing a range of distances between the outlet end of the channel and the electrode, including distances of 20 μm, 30 μm, 300 μm and 600 μm (page 7, lines 20-25; page 11, line 11 to page 12, line 2). Mathies et al. teach that the placement of the electrode can minimize the influence of the electrophoresis voltage (page 7, lines 22-25).

The apparatus and method described by Mathies et al. and Wang et al. differ from the instant invention because they do not disclose the following:

a. The first substrate is a fused-silica, silica-based, polymer, plastic or elastomer substrate, as recited in claim 8.

b. The first substrate is detachable from the second substrate, as recited in claim 21.

c. The distance between the thick-film electrode and the outlet end of the separation channel is between about 50 μm and about 100 μm, as recited in claim 24.

Regarding claim 8, Dubrow et al. teach that a variety of materials may be used for the first substrate **110**, including silica based substrates, such as glass, quartz, silicon or polysilicon, as well as polymers and plastic (col. 3, line 33 to col. 4, line 17). The substrate materials are selected according to the range of conditions to which the device may be exposed (col. 3, lines 40-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the glass substrate of Mathies et al. to use a silica-based, polymer or plastic substrate as taught by Dubrow et al. because other substrate materials may be selected according to the conditions which the device is exposed.

Regarding claim 21, Dubrow et al. teach that the second substrate **102** may be bonded to the first substrate **110**, or the substrates may be detachably connected using a clamping system (col. 9, lines 12-38).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the bonded substrates in the apparatus described by Mathies et al. and Wang et al. to use a detachable connection as taught by Dubrow et al. because a detachable connection allows the cover to be removed from the substrate containing the channels.

Regarding claim 24, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the distances in the apparatus and method of Mathies et al. to use such ranges because the separation distance are result effective variables that are dependent upon the operating conditions being used in the apparatus. Different reactions and different materials all have different properties that would require an obvious variation in the operating parameters in the apparatus and method. Mathies et al. specifically disclose that the distance between the outlet of the channel and the electrode can minimize the influence of the electrophoresis voltage (page 7, lines 22-25).

9. Claims 64, 65 and 67-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathies et al. (WO 98/09161) in view of Wang et al. ("Performance of screen-printed carbon electrodes fabricated from different carbon inks", ELECTROCHIMICA ACTA, Vol. 43, No. 23, pp. 3459-3465 (1998)) and in view of Dubrow et al. (U.S. Pat. No. 6,251,343).

Regarding claim 64, Mathies et al. disclose an apparatus and a method of using the apparatus comprising a first substrate **11** having capillary channels formed therein, and a second substrate (top plate) **14** bonded to the first substrate **11** (page 6, lines 2-16). Electrodes for electrochemical detection can be fabricated on the second substrate **14** (page 6, lines 25-27). Mathies et al. describe the conventional chips as having a plurality of separation channels **12** (page 6, lines 2-16; figure 1). Separations are

performed by applying a potential across the channel (see figure 3). The channels comprise an inlet end and an outlet end at an edge of the first substrate (figs. 18 and 20). This rejection is supported by two different interpretations of the edge of the substrate. First, as seen in Figure 20, the outlet end of the channel **46** is formed at one edge of the substrate; being formed at an edge does not require the channel to pass through the edge of the substrate. Second, the outlet end of the channel terminates a reservoir, which forms an inner edge of the substrate (figs. 18 and 20). Therefore, the outlet end of the channel terminates at an edge of the substrate.

Regarding claims 65 and 67, Mathies et al. show the first and second substrates **11** and **14** as substantially planar and parallel (0° angle) to each other, with the second substrate bonded (sealed) to the first substrate (page 6, lines 2-31).

Regarding claims 71-73, the fluidic transport system comprises a conductive system using electrodes and a high-voltage power supply to power the electrodes and create an electrokinetic fluid transport (page 7, line 1 to page 8, line 2; fig. 23).

Regarding claim 74, Mathies et al. disclose the use of a reference electrode, electrical contacts to the electrodes and an analyte analysis system connected to the detection electrode (page7, line 1 to page 9, line 30). The analysis system uses amperometric detection and can use stepped or fixed potential detection (page 9, line 17 to page 10, line 32).

Regarding claims 79 and 80, Mathies et al. disclose examples providing a range of distances between the outlet end of the channel and the electrode, including distances of 20 μm, 30 μm, 300 μm and 600 μm (page 7, lines 20-25; page 11, line 11

to page 12, line 2). Mathies et al. teach that the placement of the electrode can minimize the influence of the electrophoresis voltage (page 7, lines 22-25).

Regarding claims 81-83, the detection electrode may comprise metals or carbon (page 6, lines 25-31).

Regarding claim 84, Mathies et al. disclose that conventional apparatuses have a plurality of separation channels (page 6, lines 2-16; fig. 1).

The apparatus of Mathies et al. differs from the instant invention because Mathies et al. do not disclose the following:

a. A thick-film electrode, as recited in claim 64.

b. The second substrate is removably positionable with respect to the first substrate, as recited in claim 64.

c. A holder for holding the first substrate in a removably positionable position with respect to the second substrate, as recited in claim 68.

d. The first substrate is attached to the holder and the second substrate is removably attached to the holder, as recited in claim 69.

e. The first substrate and the second substrate are removably attached to the holder, as recited in claim 70.

f. The thick-film electrode is a screen-printed electrode, as recited in claim 75.

g. The thick-film electrode has a thickness from about 1 μm to about 100 μm, as recited in claim 76.

h. The thick-film electrode has a thickness from about 8 μm to about 30 μm, as recited in claim 77.

i. The second substrate is adjustably positionable relative to the first substrate such that the distance between the thick-film electrode and the outlet of the separation channel is variably and adjustably positionable, as recited in claim 78.

Regarding claim 64 and 75, the phrase "thick-film electrode" uses relative terminology that does not distinguish what constitutes a "thick-film" electrode. However, with regard to claim 64 and 75, Wang et al. disclose the use of "thick-film" electrodes comprising screen-printed carbon ink electrodes for microfabricated sensors and also teaches that such sensors are desirable because the are "extremely inexpensive" and are "highly reproducible electrochemical sensors" (see Abstract and Introduction).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the apparatus and method of Mathies et al. to use screen-printed, carbon ink thick-film electrodes as taught by Wang et al. because such electrodes are extremely inexpensive and highly reproducible.

Regarding claims 64, 68-70 and 78, Dubrow et al. teach that the second substrate **102** may be bonded to the first substrate **110**, or the substrates may be detachably connected using a clamping system (col. 9, lines 12-38). The clamping system can be part of the assembly or it can be separate from the substrates (col. 9,

lines 31-38). When a clamping mechanism such as a clip-style clamp or screw clamp is used, both the first substrate **110** and second substrate **102** are removably attached. Furthermore, since each substrate is removable, they are also positionable to one another.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the bonded substrates in the apparatus of Mathies et al. to use a detachable connection as taught by Dubrow et al. because a detachable connection allows the cover to be removed from the substrate containing the channels.

Regarding claims 76, 77 and 80, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the electrodes and distances in the apparatus and method of Mathies et al. to use such ranges because the electrode thickness and separation distance are result effective variables that are dependent upon the electrode material and the reaction being analyzed, respectively. Different reactions and different materials all have different properties that would require an obvious variation in the operating parameters in the apparatus and method. Additionally, Mathies et al. specifically disclose that the distance between the outlet of the channel and the electrode can minimize the influence of the electrophoresis voltage (page 7, lines 22-25).

Allowable Subject Matter

10. Claims 35 and 66 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter: Claims 35 and 66 are distinguished over the prior art of record because they recite that the second substrate is perpendicular to the first substrate. In the prior art of record, the first and second substrates are parallel to one another. There is no suggestion or motivation in the prior art of record to place the second substrate perpendicular to the first substrate. Placing the second substrate perpendicular to the first substrate would allow for different positional relationships between the electrodes and the channels.

Response to Arguments

12. Applicant's arguments filed November 21, 2003, have been fully considered but they are not persuasive.

13. Regarding the rejection of claims over Mathies et al. in view of Wang et al., Applicant presents two main arguments. First, Applicant argues, "The term 'thick-film electrode' is a recognized term of art," and provides the example of Wang et al, the abstract and references to the present disclosure (see page 16 of Applicant's response). This argument is not persuasive because the term "thick-film electrode" is not a term used in the art consistent with Applicant's meaning. Thick is a relative term,

and simply depends on how the dimension is being compared. For example, in U.S. Pat. No. 6,207,031, Adourian et al. disclose, "A 40-nm-thick film of chromium was sputtered" (see col. 19, line 66). A 40-nm (0.04 μm) "thick film" is much thinner than Mathies et al.'s 0.3 μm "thin film". As can be seen by the difference in thicknesses and terminology, the term "thick" does not imply any thickness to those skilled in the art. Furthermore, Applicant's reliance on their own definition of "thick-film" is not persuasive.

14. Applicant's second argument is also unpersuasive. Applicant argues that the thickness of a thick-film electrode "would not permit sealing" (see page 16 of Applicant's response). This argument is inconsistent with the disclosure of Mathies et al., who teach, "The substrate is preferably etched so that the electrodes and thin film conductors are inset as shown in Figure 6 whereby the top plate 14 can be effectively sealed to the substrate" (see page 7, lines 4-6). Therefore, since Mathies et al. teaches that the substrate is etched to allow the insetting of the electrodes, the thickness of the electrode does not affect the ability to seal the substrates.

15. Applicant also argues that the amendment to the claims distinguishes the invention over the prior art. Specifically, Applicant states, "Thus the media within the separation channel literally exits the channel, by means of the outlet end, and is then position against the thick-film electrode on the second substrate" (see page 16 of Applicant's response). Applicant further states, "[T]he invention as now claimed requires that the outlet be an outlet along an edge of the substrate - that is, the outlet literally provides transit from the substrate" (see page 17 of Applicant's response). This argument is not persuasive because the claim language does not require the outlet to

provide transit from the substrate. The only requirement is that the outlet end of the channel is at one edge of the substrate. This limitation allows the outlet end to be positioned at an internal edge of the substrate, such as the edge formed by a reservoir, similar to that taught by Mathies et al. In addition, the claim language also allows for the outlet end to be positioned adjacent the edge, which is also encompassed by the phrase "at the edge".

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian L. Mutschler whose telephone number is (571) 272-1341. The examiner can normally be reached on Monday-Friday from 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (571) 272-1300.

NAM NGUYEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

blm
January 20, 2004